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ABSTRACT

The document is a training bulletin for criminal investigators, explaining the use of probability, logic, lateral thinking, group problem solving, and psychological profiles as methods of solving crimes. One chpater of several pages is devoted to each of the five methods. The use of each method is explained; problems are presented for the user to solve; and applications of the method in actual criminal investigations are described. The training bulletin is illustrated by charts, diagrams, and cartoons. (AJ)

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CRIME SOLVING TECHNIQUES

TRAINING BULLETIN

Captain Jack M. Sands
United States Park Police

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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IN REPLY REFER TO:

INTRODUCTION

Most books which have been written on the subject of criminal investigation deal with the collection of data and physical evidence, and the processing of the latter. Little has been written on using probability, logic, lateral thinking, group problem solving, and psychological profiles as methods of solving crimes. This training bulletin is an endeavor to fill this void.

The evidence collection kit used by investigators contains many tools of the trade. Each tool is used at the appropriate time for the appropriate purpose. Investigators should look at the crime solving techniques described herein as tools to be used by the mind as the need arises. As in using the evidence collection tools, practice in using the various crime solving techniques, explained in this training bulletin, is necessary for maximum efficiency. The best way to practice is to exercise the brain by looking at problems in different ways.

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STORE

PROBABILITY

I. Mathematical theory of probability. "In everyday language we call something 'probable' if we believe it likely to happen, 'improbable' if we believe it unlikely to happen, or 'certain' if we believe it sure to happen. In the mathematical theory of probability we try to define such concepts more precisely so as to assign them measures, or numerical indices, which can be computed, and therefore compared, arithmetically.

The theory deals with the likelihood of things which happen by chance or are selected at random. By definition, these are events which are not influenced to happen one way rather than another by known causes. Simple instances are: the landing of a tossed coin heads or tails, or the 'blindfolded' selection of 'any card' from a shuffled deck."[1]

"The theoretical assumption by which we can put uncertainties on an exact mathematical basis is that of something happening in a definite number of equally likely ways. Instances are: the assumption of a 'well balanced' coin being equally likely to land with either heads or tails face up, or the assumption of an 'unloaded' die being equally likely to stop rolling with any one of its 6 faces up."[2]

Our discussion here will be limited to showing a few practical examples of how the mathematical theory of probability can be applied to criminal investigations. Those who wish to pursue the subject further are encouraged to study the reference.

When an investigator is assigned to a case, the only thing he knows for certain is that if in fact a crime has been committed, he didn't commit it. Everyone else is a possible suspect. Therefore, he has to "play the odds" in order to narrow the field of suspects. We often refer to these odds as hunches. Sometimes they are "educated guesses" based on long years of experience in police work. Often these hunches and educated guesses are actually examples of the theory of probability in action, even though the circumstances have not been figured out mathematically.

A. Practical application of the theory.

1. Burglary. The complainant, who lives in a housing development consisting of one hundred similar houses, has reported that her house was burglarized while she went to the store. There is no sign of forcible entry. The doors were locked when she left and when she returned home.

Investigation reveals that the complainant's house has three exterior doors, all with locks having the same key combination. This is very convenient for the homeowner since only one key is required to open any of the doors. Further investigation reveals that the contractor who built the houses, in order to save money, purchased three hundred locks with only ten different key combinations. The identical locks were installed, three per house, throughout the development. Therefore, nine other houses in the development have locks identical to the complainant's. The probability that any resident of the development would have a key that would fit any house, other than his own, is 1 in 10 or a 10% chance.

300 locks ÷ 3 locks per house = 100 houses

100 houses ÷ 10 lock combinations = 10 houses or 1/10 of total

1/10 is a probability of 1 in 10 or a 10% chance

2. Rape/Murder. Three women, <u>who did not know each other</u>, have been raped and murdered. There are 5,000 men stationed at a nearby army post. Investigation reveals that each of the victims was acquainted with only one soldier stationed at the post. Further investigation reveals that the one soldier which each victim was acquainted with was Private Smith. This could be a coincidence but what are the probabilities of this occurring? The mathematical probability is rather startling.

The probability that one victim knew Private Smith is:
1/5,000 or 1 in 5,000

The probability that two victims knew Private Smith is:
1/5,000 X 1/5,000 = 1/25 million or 1 in 25 million

The probability that all three victims knew Private Smith is:
1/5,000 X 1/5,000 X 1/5,000 = 1/125 billion or 1 in 125 billion

Since the probability of coincidence is so remote, the fact that all three victims knew Private Smith is a significant investigative lead.

a. The method used here is based on the theory that separate events are <u>independent</u> if the happening of one of the three events does not affect the probability of the happening of another. For example: There is a shuffled deck of fifty-two playing cards, one of which is the ace of spades. One person makes a blindfolded selection of one card from the deck and returns the card to the deck. A second person follows the same procedure as does a third person. What is the probability of each of the three people selecting the ace of spades?

The probability that one person will select the ace of spades is: 1/52 or 1 in 52

The probability that two persons will select the ace of spades is: 1/52 X 1/52 = 1/2,704 or 1 in 2,704

The probability that all three persons will select the ace of spades is 1/52 X 1/52 X 1/52 = 1/140,608 or 1 in 140,608

The probability would be the same if one person made three selections from one deck, providing the card drawn was returned to the deck after each selection.

b. In applying probabilities, it is important to make a distinction between separate events which are independent and those which are dependent. Separate events are said to be dependent if the happening of one does affect the probability of the happening of another. For example: There is a shuffled deck of fifty-two playing cards containing four aces. Three cards are drawn in succession without the first or second being returned to the deck. What is the probability that all three will be aces?

The probability that the first card drawn will be an ace is: 4/52 or 1/13 or 1 in 13

After drawing the first card, there are only fifty-one cards left in the deck. If the first card drawn is an ace, there are now only three aces left.

The probability that the second card drawn will also be an ace is: 4/52 X 3/51 or 1/13 X 1/17 = 1 in 221

After drawing two cards, there are only 50 cards left in the deck. If the first two cards drawn are aces, there are only two left.

The probability that all three of the cards drawn will be aces is: 4/52 X 3/51 X 2/25 = 1/13 X 1/17 X 1/12.5 = 1 in 2,562.5

3. Robbery. An armed robbery has occurred and the suspect has fled on a motorcycle. One witness is positive that a local state license plate was displayed and the last digit was "8." Another witness, who knows a great deal about motorcycles, has identified the machine as a current year model 750 Brand "X." Both witnesses agreed it was green in color.

The State Department of Motor Vehicles has a motorcycle license plate numbering system which commences with A-000 and ends with Z-999. However, to date, only plate numbers A-000 through N-999 have been issued. Thirty percent of the motorcycles registered in the state are Brand "X," of which twenty percent are current year models. Of the current year models, fifty percent are of the specific 750 model series. The machine comes in red, green, and blue. However, the Department of Motor Vehicles does not record the color in its title and registration records.

The day after the robbery, an officer somewhere in the state stops a motorcycle which exactly fits the description given. What is the probability that this particular motorcycle was used to flee the crime scene?

a. Each series of license plate numbers with a different letter prefix has a total of 1,000 different numbers. For example, A-000 through A-999 contains 1,000 numbers. All twenty-six letters of the alphabet are used as a prefix. Therefore, 26 X 1,000 = 26,000 license plates. However, only plates A-000 through N-999 have been issued. N is the 14th letter of the alphabet. Therefore, 14 X 1,000 = 14,000 plates issued.

b. Thirty percent of all registered motorcycles in the state are Brand "X." Therefore, 30% of 14,000 plates issued equals 4,200 plates issued to Brand "X" machines.

c. Twenty percent of the registered motorcycycles are current year models. Therefore, 20% of 4,200 Brand "X" motorcycles equals 840 current year models.

d. Fifty percent of current year model Brand "X" machines registered are of the specific 750 model series. Therefore, 50% of 840 current year models equals 420 specific 750 model machines.

e. The last digit of the suspect license plate is "8." There are ten possibilities in each series of 100 numbers. For example, in the series beginning with A-000 and ending with A-999, the numbers 008, 018, 028, 038, 048, 058, 068, 078, 088, and 098 are all possibilities (See Table 1). The fourteen prefix letters A through N have been used on the plates issued. Therefore, 14 X 100 possibilities equals 1,400 which is 10% of the 14,000 plates issued.

f. Since ten percent of all plates issued have a last digit of "8," we can assume that any random group which is part of the total would also have ten percent with the last digit of "8." In step d above, it was determined that there were 420 registered motorcycles in the suspect category. Therefore, 10% of 420 machines equals 42. The probability that the machine stopped by the officer is the same one involved in the robbery is 1/42 or 1 in 42 which is slightly over a 2% chance.

TABLE 1

LICENSE PLATES WITH LAST DIGIT "8"

PREFIX											TOTAL
A -	008	018	028	038	048	058	068	078	088	098	10
	108	118	128	138	148	158	168	178	188	198	10
	208	218	228	238	248	258	268	278	288	298	10
	308	318	328	338	348	358	368	378	388	398	10
	408	418	428	438	448	453	468	478	488	498	10
	508	518	528	538	548	558	568	578	588	598	10
	608	618	628	638	648	658	668	678	688	698	10
	708	718	728	738	748	758	768	778	788	798	10
	808	818	828	838	848	858	868	878	888	898	10
	908	918	928	938	948	958	968	978	988	998	10
TOTAL	10	10	10	10	10	10	10	10	10	10	100

g. The color of the machine was not considered in figuring the probability, because no information was provided to indicate how the colors were distributed. The motorcycles are available in three colors, but we don't know if there is an equal number of each color or if perhaps ninety percent are red and the remaining ten percent are blue and green. If this information could be obtained from dealers' records, it could be considered in arriving at the probability. However, the machine could have been repainted.

h. When initial attempts have failed to locate the machine, a computer printout listing all the registered owners of the particular make, year and model of the machines with a license plate having a last digit of "8" should be obtained from the Department of Motor Vehicles.

B. Statistical probability. As used here, the term relates to the probability that a person coming within a certain category or categories committed the crime we are trying to solve. The values are learned statistically from experience. When using statistical probability, it is important to have a broad base of statistical data to refer to. It would be foolhardy, for example, to look at the annual statistics for a community which had three murders and try to reach any conclusions based on the murder statistics. It is also important to use current statistics and be aware of any trends.

There are various categories relating to persons who have been arrested in the past for specific crimes which can be helpful in arriving at probabilities for a case under investigation. This discussion will be limited to sex and age groups of offenders, except that circumstances will be considered for the crime of murder/ non-negligent manslaughter. Race of offenders should be considered at the local level. It has been omitted here because the population composition varies substantially from one area to another. The statistics used in this discussion were published in the Uniform Crime Reports. They represent the total nationwide statistics for one year. The reference is published annually in paperback form and is available at nominal cost from the Government Printing Office. Investigators are encouraged to obtain a copy on an annual basis.

1. Murder/non-negligent manslaughter. During one year, 6,004 police agencies reported there were 19,510 known murders with 14,399 persons arrested.[3] Seventy-nine percent of the cases were closed by arrest.[4] Table 2 shows the breakdown of offenders by sex and age group as well as crime circumstances. As the table indicates, nearly 85% of those arrested for the crime were males. Therefore, based on these nationwide murder statistics there is an 85% chance that an unsolved murder was committed by a male. By examining the breakdown by age group, we may conclude that there is a 25% chance that an unsolved murder was committed by a person between 20 and 24 years of age. There is a 72% chance the killer is under 35 years of age. There is a 23% chance the killer is a relative of the victim. The offense circumstance percentages shown in Table 2, have remained quite constant during a period of six consecutive years.[5]

TABLE 2

MURDER AND NON-NEGLIGENT MANSLAUGHTER NATIONWIDE PERCENT DISTRIBUTION[6]

TOTAL ARRESTS BY SEX

Males	Females
84.9%	15.1 %

TOTAL ARRESTS BY AGE

Under 18	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 & Over	Total
10%	10%	25%	16%	11%	8%	7%	5%	3%	2%	1%	2%	100%

(Total under 35: 72%)

OFFENSE CIRCUMSTANCES

Spouse Killing Spouse	Parent Killing Child	Other Family Killings	Romantic Triangle and Lovers' Quarrels	Other Arguments	Known Felony Type *	Suspected Felony Type *	Total
12.3%	3.2%	7.7%	7.5%	40.3%	21.6%	7.4%	100%

(Total family killings: 23.2%)

*Note: Felony murders are killings resulting from robbery, burglary, sex motive, gangland and institutional slayings, and all other felonious activities.

TABLE 3

NATIONWIDE ARRESTS BY SEX AND AGE FOR SELECTED OFFENSES[7]

(Percent Distribution)

OFEENSE	MALES	FEMALES	PREDOMINATE AGE GROUPS
Forcible Rape	100%	-	61% under age 25
Robbery	93.2%	6.8%	76% under age 25 55% under age 21 34% under age 18
Aggravated Assault	86.8%	13.2%	69% age 21 and over
Burglary	94.6%	5.4%	84% under age 25 54% under age 18
Larceny-Theft	68.5%	31.5%	66% under age 21 48% under age 18
Auto Theft	94%	6%	74% under age 21 56% under age 18
Arson	89.1%	10.9%	59% under age 18 40% under age 15
Vandalism	92.2%	7.8%	69% under age 18 42% under age 15
Runaways	44.5%	55.5%	40% under age 15

2. Other selected offenses. Table 3 shows the percentage distribution by sex of offenders and predominate age groups for nine other selected offenses. The first six offenses listed are Part I offenses, while the remaining three are among numerous other crimes classified as Part 2 offenses.

II. "Score cards." These can be useful in helping to determine whether a criminal complaint is valid. They can be made up for various offenses. Chart 1 shows an adult rape score card as an example. If the figures in the plus column add up to a higher total than those in the minus column, the probability is that the complaint is valid. Otherwise, the probability is that it is invalid. Similar score cards can be made for robberies, burglaries, larcenies, and suspected arson cases where there is a possibility that the complaint is false and the complainant is attempting to defraud the insurance company.

III. Presumption of Purposefulness.[8] Some offenses which the investigator is called upon to investigate are accidental occurrances resulting from negligence on the part of an individual. A hit and run traffic accident is an example. In such cases, we may assume that the individual we are seeking was at the scene of the offense at the time it occurred, because he was pursuing some purposeful objective. He was coming from one place and going to another in what seemed to him to be a logical route of travel. Of course, there are exceptions as in the case of the lost motorist or the joyrider. In discovering the individual's objective, there are three factors which should be considered.

1. Time of the incident
2. Direction of travel prior to the incident
3. Direction of travel after the incident

For example, if a hit and run accident occurs on a commuter route during the morning rush hour traffic period, the driver is probably a commuter coming from home en route to work. He probably uses the same route every day. Following the accident, he may use a different route for a few days, but he probably will resume his normal route of travel within a short period of time. If we have a description of the car involved, we may be able to locate it by observing traffic in the vicinity, from a parked position, during the morning traffic period.

In an effort to discover the motorist's probable destination, an investigator may study a map of the area and assign numerical values to possible destinations. Chart 2 shows an example of how numerical values might be assigned using probability weights of one to three. The same technique can be used to help determine where the motorist was coming from.

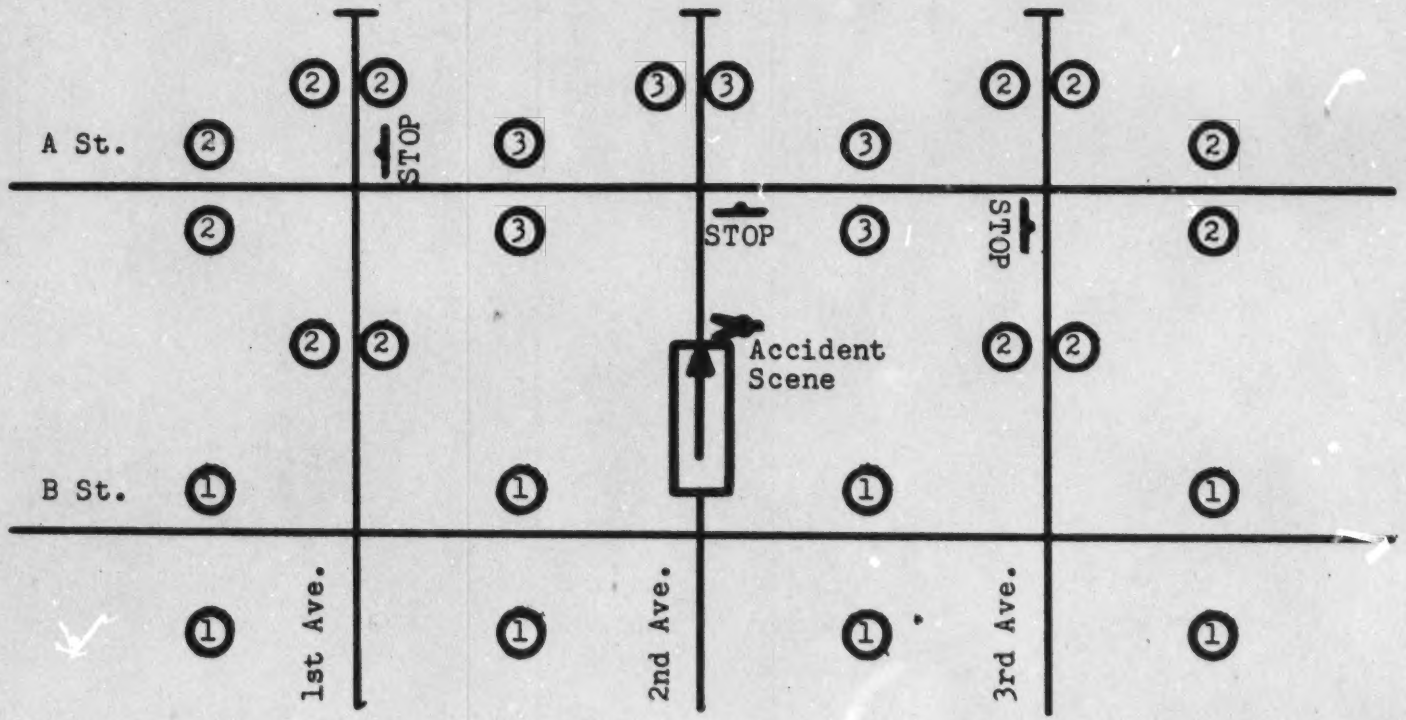
IV. Technical assistance. In complex major cases, mathematicians and mathematical computers can be of assistance with probability problems.

ADULT RAPE SCORE CARD CHART 1	+	-	Comments
1. Emotionally upset? (If yes plus 1, if no minus 1.)			
2. Condition of wearing apparel. (If torn, soiled, etc. plus 1. If not minus 1.)			
3. Was victim acquainted with rapist? (If no, plus 1. If yes, minus 1.)			
4. Did victim voluntarily accompany rapist? - ride in car, etc. (If no, plus 1. If yes, minus 1.)			
5. Were abnormal acts committed? (fellatio, buggery, cunnilingus, use of artificial phallus). (If yes, plus 2, if no minus 1.)			
6. Was victim threatened with bodily harm, by weapon, harm to relatives, etc.? (If yes, plus 1, if no minus 1.)			
7. Was there more than one man? (If yes plus 1, if no minus 1.)			
8. Is there evidence of recent trauma? (abrasions, contusions, lacerations to body, etc.) If yes, plus 1, if no minus 1.)			
9. Foreign body material on vulva, buttocks, etc.? (If yes, plus 1, if no minus 1.)			
10. Evidence of recent trauma to vulva, anus? (If yes, plus 1, if no minus 1.)			
11. Evidence of previous intercourse? Date of last under comments. (If yes plus 1, if no minus 1.)			
12. Acid phosphatase levels: - vulva - anus - mouth			
*13. Sperm (motile).			
*14. Sperm (non-motile).			
TOTAL:			

* No. 13 & 14 - answer only one question.
Form designed by a medical examiner to help determine validity of rape complaint. Items 1 through 8 can usually be answered by investigator. Items 9 through 14 should be determined by a doctor

PROBABLE DESTINATION OF HIT & RUN DRIVER

CHART 2



Traveling North -
From 2nd Ave. & B St. to:

- (3) - 1 stop sign
- (2) - 2 stop signs
- (1) - wrong direction

Probable Destination

- (3) - probable
- (2) - maybe
- (1) - unlikely

TWO TRUISMS: A. The shortest distance between two points is a straight line.

B. A person is likely to take the route of least resistance from one point to another.

LOGIC

17

LOGIC - A SYSTEMATIC APPROACH TO SOLVING CRIMES

I. Introduction. We all use logic in our daily routine to help solve problems and make decisions, whether they relate to the job or to our personal lives. In criminal investigations, it is necessary to use logic to solve crimes. The more difficult the case is, the greater the challenge to the mind of the investigator.

No attempt is made here for an in-depth study of the subject of logic. Colleges offer courses in introductory, intermediate, and advanced logic. However, by applying the basic principles described here, an investigator can analyze the facts of a case in a systematic manner and reach some logical conclusions. One conclusion often leads to another until the case is solved. A crime has to be solved one step at a time just as any other puzzle.

II. Terms. Before we attempt to apply logic to criminal investigations, we should first understand some of the common terms relating to the subject. The following are some brief definitions which are pertinent:

A. Logic: The science which investigates the principles governing correct or reliable inference.

B. Proposition: A statement in which something is affirmed or denied of a subject.

C. Premise: A proposition (or one of several) from which a conclusion is drawn.

D. Suppressed premise: A premise that does not have to be stated because it is understood. Example: Water is a liquid.

E. Argument: A process of reasoning. (Note that as used here, it is not the loud verbal debate as we normally define the word in police work.)

F. Reason: A premise of an argument. To draw conclusions or inferences from facts or premises.

G. Conclusion: A proposition concluded or inferred from the premise of an argument.

H. Deduction: Inference by reasoning from generals to particulars; reasoning by deduction. (opposed to induction) Example: We know that a human being walking on snow makes a distinctive footprint. Therefore, if we see such a footprint in the snow, we can logically conclude that a human being made the footprint.

I. Induction: The process of discovering explanations for a set of particular facts, by estimating the weight of observational evidence in favor of a proposition which (usually) asserts something about that entire class of facts.

J. Inductive reasoning: The process of discovering a general rule by examining a number of examples. (opposed to deduction) Note: Inductive conclusions can seldom be "true" since a perfect inductive conclusion can be made only when all examples have been examined and this is seldom possible. Still if all the examples we look at support our conclusion and we find none that are exceptions to the rule, we may feel fairly certain that our inductive conclusion is correct. Example: No two fingerprints have ever been found to be identical. Not all fingerprints in the world have been compared, but millions have. Therefore, we can logically conclude that a fingerprint found at a crime scene which matches a suspect's inked fingerprint in the files, was made by the suspect.

K. Aristotelian Logic: According to the Greek philosopher Aristotle (384-322 B.C.), there are only four basic ways of stating a premise, and the same four basic ways of stating a conclusion. The four propositional forms are:

1. All S is P.		1. All criminals are men.
2. No S is P.		2. No criminals are men.
	OR	
3. Some S is P.		3. Some criminals are men.
4. Some S is not P.		4. Some criminals are not men.

L. Syllogism: An argument with two premises and a conclusion. Any argument can be restructured into a syllogism. Doing so makes the argument easier to understand. There are three types of syllogisms:

1. Categorical: Both the premises are categorical propositions containing just three distinct terms between them. Example:

Major premise: All men are mortal.
Minor premise: Socrates is a man.
Conclusion: Therefore, Socrates is mortal.

2. Hypothetical: At least one premise is a hypothetical proposition. Example:

Major premise: If Smith is eligible to vote he is a citizen.
Minor premise: Smith is eligible to vote.
Conclusion: Therefore, Smith is a citizen.

3. Disjunctive (distinguishing): At least one premise is a disjunctive proposition. Example:

Major premise: Either Smith is out of town or he is ill.
Minor premise: Smith is not ill.
Conclusion: Therefore, he is out of town.

III. Some General Rules to Remember.

A. Premises are either true or false.

B. No valid conclusions can be drawn from false premises.

C. Arguments are either valid or invalid (logically correct or incorrect).

D. Conclusions are either valid or invalid. A valid conclusion isn't necessarily true and an invalid one isn't necessarily false.

E. A conclusion can be valid even if the argument was invalid providing the premise was true.

IV. Fallacies. Any error in logic can be called a fallacy. Fallacies often occur because of a breakdown in communications between the sender and the receiver of a message. If we are putting a child's toy together on Christmas Eve and we misunderstand the printed instructions, we may end up with an important part left over. Then we have to take the toy all apart and start over again. We have wasted time and become frustrated.

The same thing occurs in criminal investigations. In solving a case, we often have to rely on communications from others. These communications are both written and verbal. They come from complainants, witnesses, suspects, informants, laboratory technicians, medical examiners, radio dispatchers, teletype operators, central files, other officers, etc. A misunderstood message may lead us to an invalid conclusion. Then, if we use this conclusion as a premise to reach another conclusion, we have reached two invalid conclusions. This can go on until we discover the error. Then, like assembling the child's toy, we have to start all over again. It is important to understand the message and use it in the proper context. We shouldn't hesitate to ask questions to ensure that we understand messages.

Some fallacies, of course, are simply the result of what might be called "sloppy thinking". The nurse who awakens a patient to give him his sleeping pill might be called a "sloppy thinker", or worse, depending upon the personality of the patient.

The following quiz emphasizes the discussion of fallacies.

SOME CONCLUSIONS: LOGICAL OR FALLACY?

Determine whether the following conclusions are valid or invalid. If the conclusion is valid, write the letter "V", otherwise write the letter "I". Be able to justify your answers.

____ 1. Words of five letters are bigger than words of four letters. Seven is a word of five letters and nine is a word of four letters. Therefore, seven is bigger than nine.

___ 2. Mount Rainier is the highest mountain in Washington.
The highest mountain in Washington is Mount Rainier.
A bear is an animal.
Therefore, an animal is a bear.

___ 3. A shoe print found in the snow at the crime scene is a positive match to a certain shoe.
The shoe is found in Robert Taylor's bedroom.
Therefore, the shoe was at the crime scene sometime after it snowed.

___ 4. The Western Regional Office is the office that services park areas in Nevada, Arizona, and California.
Lava Beds National Monument is in California.
Therefore, Lava Beds National Monument is served by the Western Regional Office.

___ 5. No two-year olds are as tall as police officers.
Some police horses are two year olds.
Therefore, some police horses are not as tall as police officers.

___ 6. John is a blood brother of George and George is a blood brother of Sam.
Therefore, John is a blood brother of Sam.

___ 7. John is a friend of George and George is a friend of Sam.
Therefore, John is a friend of Sam.

___ 8. Blondes have more fun.
Harry's wife is a blonde and Jim's wife is a brunette.
Therefore, Jim's wife has less fun than Harry's.

___ 9. A bullet found in the victim's body is positively identified as having been fired from a certain revolver.
Robert Brown is the owner of the revolver.
Therefore, Robert Brown is the murderer.

___ 10. Accidents are frequent occurrences.
The explosion of the stove in the substation was an accident.
Therefore, the explosion of stoves in substations is a frequent occurrence.

___ 11. A fragment of glass found in the hit and run victim's clothing is a positive match to a broken headlight from a certain vehicle.
Tony Price is the owner of the vehicle.
Therefore, Tony Price's vehicle was involved in the accident.

___ 12. No two fingerprints have ever been found to be identical.
One of Slippery Smith's fingerprints was found on the murder weapon.
Therefore, Slippery Smith is a person who handled the murder weapon.

___ 13. The blood is from a person with blood type "A".
Three of the suspects' blood type is other than "A".
Therefore, the blood is from someone other than these three suspects.

___ 14. The drag factor of the pavement is .60
The length of the striking vehicle's skids is 250 feet.
Therefore, the striking vehicle was traveling at least 68 mph.

___ 15. All creatures with fur have four legs.
No creatures with four legs have wings.
Therefore, no creatures with fur have wings.

CORRECT ANSWERS TO "SOME CONCLUSIONS: LOGICAL OR FALLACY?"

1. Invalid. This is a classic example of a communications problem. To be logical for the two premises stated, the conclusion would have to be written out completely: "Seven is a bigger word than nine." When interviewing witnesses, you have to be very careful that you understand what they are telling you so that you may reach a logical conclusion. Be a good listener and don't jump to conclusions.

2. Invalid. The first two statements, of course, have nothing to do with the others. The point is that the word "is" often causes confusion. The first two sentences can be readily reversed and result in the same meaning. However, the last two cannot. Does "is" mean "equivalent to" or "is included in the class of"?

3. Valid. The two premises are valid and lead to a logical conclusion. We probably suspect Taylor, but further investigation will have to be undertaken to determine if the shoe belongs to him. If it does, we will have to show that he was wearing it when the shoe print was made.

4. Invalid. If you didn't already know the answer, you probably answered, "valid". The first premise is not complete. The Western Regional Office does serve all park areas in California except Lava Beds National Monument. This area is served by the Pacific Northwest Regional Office. This is an example of how one might reach a conclusion based upon incomplete information. It is misleading.

5. Invalid. Sometimes words change meaning in the course of an argument. The trouble here is that the premises have not been written out in full. Comparing humans with horses is like trying to compare apples with oranges. Once again the importance of effective communications is brought out. The receiver must understand the sender's message if he is to reach a logical conclusion.

6. Valid. This is a logical conclusion based on true premises.

7. Invalid. There is insufficient information to arrive at a conclusion. John and Sam may not even know each other. On the other hand, they may know each other and be bitter enemies.

8. Invalid. The first premise is misleading - an unproven cliche used in hair coloring commercials. Like many such catchy phrases it was thought up by some advertising man. Some people tend to believe there must be some truth in such cliches if they are exposed to them enough times. The fact that a blonde woman has fun or a woman who becomes a blonde thinks she has more fun than before has no relation to the degree of fun that women with different colored hair have. Conclusions based upon such misleading premises are fallacies.

9. Invalid. There is insufficient information to reach such a conclusion. The fact that Brown owns the revolver is circumstantial evidence. Further investigation may reveal that someone else, using Brown's revolver, shot the victim.

10. Invalid. From the information provided, it would be a fallacy to arrive at such a conclusion. The conclusion may in fact be true, but further investigation would be required to gather more information to either prove or disprove it.

11. Valid. A logical conclusion arrived at from two true premises. Further investigation is required to determine who was driving the vehicle.

12. Valid. This is a logical conclusion based upon two true premises. You may also suspect that Smith is the murderer, but there is insufficient information to reach that conclusion at this point. The fingerprint is circumstantial evidence and its weight as evidence will be determined by a judge and/or jury along with other evidence.

13. Valid. This is a logical conclusion. A person can have only one type blood.

14. Valid. This is a logical conclusion arrived at from making test skids at the scene and referring to the nomograph on the accident investigator's template.

15. Invalid. This is a tricky one. A bat is a creature with fur and wings. He has four limbs, two in front and two in back. The bat is the only mammal with the capacity for true flight. Both forelimbs have been modified into wings by the greatly elongated fingers, with thin webs between the digits and connecting them with the hind limbs and the tail. Bats vary greatly in color and appearance. The coats range, according to species, from thick fur to nearly hairless skin. The ghost bat has pure white fur. Beware of arriving at conclusions before you have all the facts!

DILEMMA

"Your money or your life."

PARADOX

"I always lie -
and that's the truth."

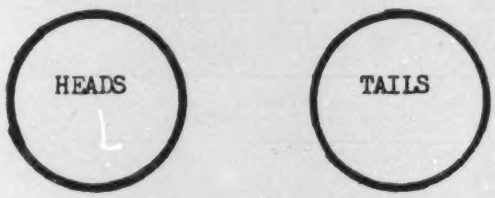
FALLACY

"Scorpio is your sign.
Scorpio is my sign.
Therefore: What's yours is mine."

V. Paradox. A paradox is a statement or proposition seemingly self-contradictory or absurd and yet explicable as expressing a truth. Example:

> A suspect says: "I always lie and I'm lying now." If the statement is taken as true, then he is lying (that's the truth he told) and so the statement has to be false (because he lied). If the statement is taken as false, then it's not true that he's lying now, so he must be telling the truth, and therefore he is lying.
>
> It can't be true and it can't be false. Since every statement has to be one or the other, where are we?

VI. Dilemma. A dilemma is a form of argument in which two or more alternatives are presented, each of which is indicated to have consequences (sometimes unfavorable) for the one who must choose. The most well known are situations that present just two choices, and both choices are unfavorable. Example:



"Heads I win." "Tails you lose."

VII. Cause and effect reasoning.

A. Introduction. John Stuart Mill, noted nineteenth century British philosopher and logician developed what he called "methods" for the analysis of causes and effects in specific situations. The methods are helpful in conducting investigations such as those where the source of food poisoning among groups of people must be determined.

B. Method of agreement. "If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all of the instances agree is the cause (or effect) of the given phenomenon."[9] Example:

> Twenty people had a family picnic. The beverages consisted of beer, ginger ale, and milk. The food consisted of five salads: potato, egg, ham, tuna fish, and chicken. Fifteen people became ill from food poisoning and required hospitalization. Investigation revealed that all twenty people drank a beverage, but only the fifteen people who became ill ate salad. Each person ate only one kind of salad, but some of all the salads had been eaten. Mayonnaise was the only common ingredient for all of the salads. The problem can be stated:
>
> Salad was eaten by all ill people.
> The only common ingredient in all salads was mayonnaise.
> Therefore, the mayonnaise was the source of the food poisoning.

C. Method of difference. "If an instance in which the phenomenon under investigation occurs and an instance in which it does not occur have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon." [10] Example:

> A and B had dinner together. Except for the kind of salad dressing, both ate exactly the same foods. A had French dressing on his salad while B had Russian dressing. A died from food poisoning, while B did not get sick. The problem can be stated:
>
> French dressing was eaten by the deceased.
> French dressing was the only different food eaten by the deceased.
> Therefore, the French dressing was the source of the poisoning.

D. Joint method of agreement and difference. "If two or more instances in which the phenomenon occurs have only one circumstance in common, while two or more instances in which it does not occur have nothing in common save the absence of that circumstance, the circumstance in which alone the two sets of instances differ is the effect, or the cause, or an indispensable part of the cause, of the phenomenon." [11] Example:

> Five groups of people having picnics purchased pizzas from the same restaurant. The people in three of the groups became ill from food poisoning and had to be hospitalized. The people in the other two groups were not ill. Investigation revealed that five different varieties of pizzas were purchased by the various groups. However, none of the groups purchased the same combination of varieties.
>
> The following chart is helpful in determining the source of the food poisoning.

Variety of Pizza
A - pepperoni
B - cheese
C - sausage
D - anchovies
E - mushroom

Is - Is Not
"Is" means the group purchased the variety.
"Is Not" means the group did not purchase the variety.

ILL PEOPLE						PEOPLE NOT ILL			
GROUP #1		GROUP #2		GROUP #3		GROUP #4		GROUP #5	
Is	Is Not	Is	Is Not	Is	Is Not	Is	Is Not	Is	Is Not
A	D	A	B	B	A	A	B	B	A
B		D	C	D	C	C	D	D	C
C		(E)		(E)			(E)		(E)
(E)									

As can be seen in the chart, the mushroom pizza (E) was the only common variety purchased by all three groups of people who became ill. It was also the only common variety which was not purchased by groups #4 and #5. The problem can be stated:

Mushroom pizza was eaten by the ill people.
Mushroom pizza was the only different food eaten by them.
Therefore, the mushroom pizza was the source of the poisoning.

VIII. An analytic approach to solving crimes.[12]

A. Introduction. A problem is always caused by a change. Since a crime is a problem, something from the normal has changed to cause the crime to occur. The analytical technique of problem solving, described here, can help the investigator solve certain crimes if he will apply the concepts involved and discipline himself to systematic thinking. This analytical tool for the investigator is based on the following concepts:

1. A planned or desired performance standard exists against which the actual can be compared.

2. Any deviation as a result of this comparison of actual to standard is a problem.

3. A deviation recognized as a problem by the investigator must be accurately identified, located, and pinpointed as to time and extent.

4. Something always distinguishes that which has been affected by the cause from that which has not.

5. The cause of the problem is always the relevant change that has taken place to produce a new and unwanted effect.

6. Probable causes of the deviation are deduced from the relevant changes found by the investigator in analyzing the problem.

7. The cause of a deviation is one that exactly explains all the facts in the definition of the problem.

B. Steps in problem analysis.

1. Comparison of desired with actual.

2. Determination that deviation is a problem.

3. The problem IS: what-where-when-extent.

4. The problem IS NOT: what-where-when-extent.

5. Identification and comparison of distinctions and changes.

6. Deduced effects of possible causes.

7. Comparison of deduced effects with actual.

C. Problem definition chart. After the facts relating to the problem (crime) have been collected, the problem definition chart is helpful in sorting out the relevant from the irrelevant information. Completion of the chart is a narrowing process. It helps to pinpoint the source of the problem. (the perpetrator of the crime). See chart 3 relating to the internal theft case which follows.

D. Example: Internal theft case.

FACTS REVEALED BY INVESTIGATION

1. A businessman, named Harry R. Johnson, operates five small restaurants in one area. The restaurants are located in buildings identified as (A) through (E).

2. The managers of the restaurants are: John P. Dove (A), Roland O. Franklin (B), Ralph NMI Brooks (C), Jack L. Thompson (D), and Jerome W. Sample (E).

3. The restaurants are open from 0600-2100 hours daily.

4. In each restaurant, meat is stored in a locked freezer. The owner and managers are the only persons with authorized keys to the freezers.

5. When the freezers were installed, identical locks, using identical keys, were affixed to them.

6. Janitors who regularly clean up the restaurants between 2100 and 2400 hours are: Joseph T. Tyler (A), Homer NMI Donner (B), Theodore C. Clark (C), Reginald Z. Smith (D), and Thomas M. Naylor (E). All have been employed in these buildings for two or more months.

7. At 0615 hours, June 6, John P. Dove reported that five pounds of ground beef was missing from the freezer in his restaurant when he opened for the day. There was no sign of forced entry.

8. On June 12 at 0610 hours, Roland O. Franklin reported that five pounds of bacon was missing from the freezer in his restaurant when he opened. There was no sign of forced entry.

9. At 0314 hours, June 25, police found the front door of building (E) unlocked. Nothing was found to be missing.

10. On June 23, Reginald Z. Smith was involved in a traffic accident enroute to work. Thomas M. Naylor performed Smith's duties as well as his own.

11. At 0605 hours, June 17, Ralph NMI Brooks reported that five pounds of pork chops were missing from the freezer in his restaurant when he opened. There was no sign of forced entry.

12. On June 5, Joseph T. Tyler's wife was ill and he didn't work. Theodore C. Clark performed Tyler's duties as well as his own.

13. Jack L. Thompson is Harry R. Johnson's son-in-law.

14. On June 24 at 0604 hours, Jack L. Thompson reported that five pounds of steak was missing from the freezer in his restaurant when he opened. There was no sign of forced entry.

15. On June 17, John P. Dove's daughter was married and Harry R. Johnson worked in his place.

16. On June 11, Homer NMI Donner was drunk and failed to report for work. Thomas M. Naylor performed Donner's duties as well as his own.

17. Every Monday, 150 pounds of assorted packaged meats is delivered to each restaurant.

18. On June 24, Homer NMI Donner didn't work because his car was disabled. Roland O. Franklin performed Donner's duties.

19. Sometime in late May, Jerome W. Sample misplaced his key to the freezer and had a new lock installed. The lock and key are different than those on the freezers in the other restaurants.

20. On June 5, Joseph T. Tyler went to night school and Thomas M. Naylor performed Tyler's duties as well as his own.

21. Theodore C. Clark's brother-in-law, Robert V. Toms has a criminal record for larceny from autos.

22. On June 1, Reginald Z. Smith asked for a pay raise and was turned down.

23. During the month of May, meat prices increased an average of 40¢ per pound.

24. On June 16, Theodore C. Clark had a tooth pulled and didn't work. Thomas M. Naylor performed Clark's duties as well as his own.

25. On June 16, Joseph T. Tyler was arrested for driving while under the influence before he got to work. Reginald Z. Smith performed Tyler's duties as well as his own.

CHART 3

PROBLEM DEFINITION CHART

DEVIATION: Internal theft.

	IS	IS NOT	What is distinction of the IS?	Any change in this?
WHAT	Missing meat.	Any other property.	Meat stored in locked freezers.	.No.
WHERE	Bldg. (A) Bldg. (B) Bldg. (C) Bldg. (D)	Bldg. (E)	Same key fits freezers (A), (B), (C), (D).	Yes. Manager (E) misplaced freezer key in May. Prior to this, same keys fit all five freezers.
WHEN	Early A.M. 6/6 (A) 6/12(B) 6/17(C) 6/24(D)	Any other days.	Janitor Naylor cleaned these bldgs. only on the nights previous to these days. Worked regularly in bldg. (E) during time key (E) was misplaced.	Yes. Thefts commenced after key (E) was misplaced.
EXTENT	5 lbs. ea. time.	Over 5 lbs.	Can be hidden on person.	No.

Possible tests:

1. Background investigation of Naylor.
2. Stake outs when Naylor is working in buildings other than (E).
3. Place positive identification marks on meat packages in freezers.
4. Silent alarms on freezer doors.
5. Hidden camera surveillance of freezers during selected periods.
6. Confront Naylor with the facts.

IX. Matrices.

A. Introduction. A matrix is defined as that which gives form to a thing or which serves to enclose it. As used here, it is simply a chart in which data is organized into categories. The use of matrices can be helpful when investigating a series of like crimes where multiple victims are involved. In such cases, the modus operandi is often the same because the same person committed all of the crimes. In solving such crimes, it is necessary to find as many common denominators as possible. What did all of the victims have in common? What is the significance of this?

B. Crime circumstance matrix. In a series of similar murder cases where female victims have been sexually assaulted, murdered, and their bodies dumped, the following categories would be some of the appropriate matrix headings.

1. Time, date, and day of week last seen alive.

2. Location where last seen alive.

3. What was victim doing when last seen alive?

4. Time, date, and day of week of death. (If possible to determine.)

5. Geographic location of body.

6. Habits and regular activities of victim.

C. Victim associate matrix. In a series of crimes such as described above, it is necessary to discover who knew all of the victims. If the victims did not know each other, it is often a difficult task. Investigators' reports will contain countless names. A victim associate matrix, such as chart 4 is useful in organizing the names into categories so that associates' names common to more than one victim can be recognized.

Of course, in a series of major cases, hundreds or even thousands of names come up in the investigations. Processing the data into useful information so that investigators can readily recognize common names requires a system more elaborate than a matrix. Even in cases where a matrix is used, it is helpful to supplement it with other organized records.

1. Automated data processing. Names and other identifying information can be stored in a computer data bank. An alphabetical name listing on a computer printout will enable investigators to readily recognize names which appear more than once.

VICTIM	(A) MALE LEADERS CLUBS/ORGANIZATIONS	(B) MALE SCHOOL TEACHERS	(C) MALE ASSOCIATES: PART TIME JOB	(D) CLOSE MALE FRIENDS OF FAMILY	(E) VICTIM WAS BABY SITTER FOR:
#1 (case #78)	Girl Scouts Horace Sims Mark Temple	City High Richard Colson Henry Ford James Jones* John Neely	City Drug Store Franklin Foley Gerard Yuma	Moses Clayton Merwin Rutter Barry Thornton Karl White	Larry Mace Thomas Saltsman Earl Winter Vernon Zeh
#2 (case #81)	Campfire Girls David Bowen Jerry Huffman George Wells	Williams High Scott Armstrong Delmer Barrett Daniel Buck Patrick Rew	Dart Drug Store James Jones* Chris Murphy Paul Nawrot Steve Rodman	Arthur Lewis Clarence Lindsay John Rivers Jimmie Tyler Robert Wise	George Arthur Vance Lee John Oliva Roscoe Reed
#3 (case #99)	Library Club Larry Ables Robert Frost	City High Earle Campbell Richard Colson Charles Howe Kirk Knott	Fargo Variety Ray Ayres Orville Mill John Siler	Ken Avery Dave Rhodes Lyman Saltsman Edward Sanders	Steven Connor Bobbie Fava James Jones* Thomas Long
#4 (case #100)	Drum/Bugle Corps Wayne Albright Marshall Best James Jones* Jack Morris George Wells	Central High Gale Bowen Willie Brito Ernest Carroll Robert Johnson	Town Dept. Store David Braxton Franklin Foley Kent Smith	Jack Atchison Harold Feser Benjamin Herring Don Lindsley Mark Temple	Raymond Fonda Reginald Helton Albert Pierce Barry Thornton George Van Arnam Charlie Woodbury
#5 (case #203)	Church Choir Peter Smith Paul Wiggins	Williams High Howard Barr Fred Emery Patrick Rew Otis Wood	McDonald's Restaurant Edwin Blank James Irwin Stephen Kammer	Louis Hutchins James Jones* Robert Parnell Alexander Pereira Phillip Rice	Dennis Ellison Alton Fischer Floyd Holley Hugh Posey Earl Winter

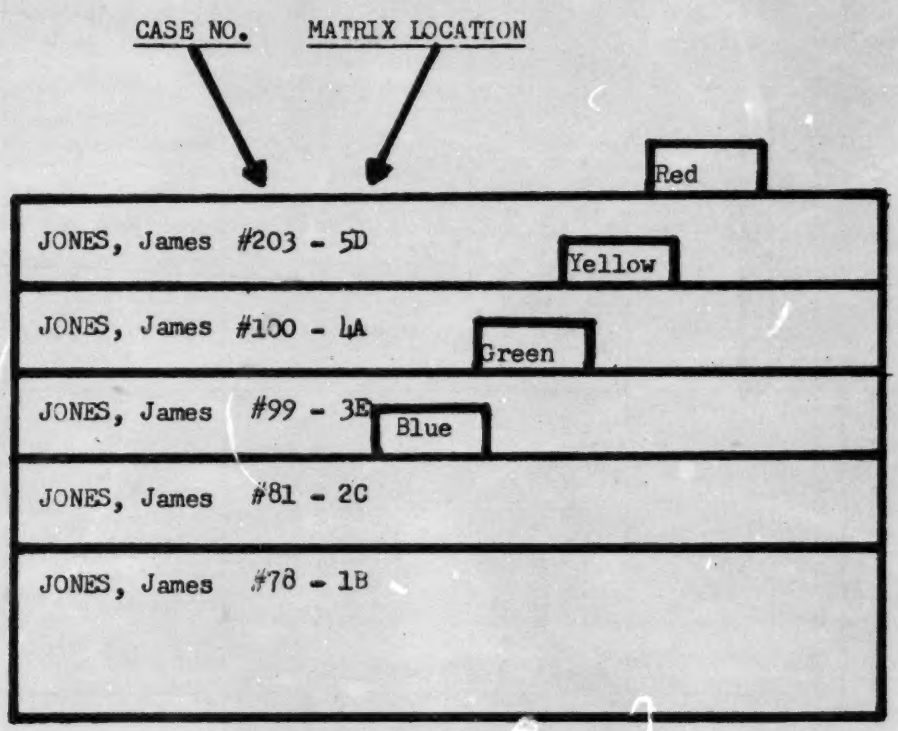
VICTIM ASSOCIATE MATRIX

CHART 4

*Note: Although some names show up in categories for more than one victim, James Jones is the only name which appears in a category for all five victims. This provides an investigative lead. Obviously, more categories merit consideration. Examples would be boyfriends, deliverymen, recreation center employees, bus drivers, hospital attendants, and store clerks where victims shopped.

2. Card file. In the absence of computer availability, investigators can make a simple alphabetical name file on 3"X5" index cards. In addition to the associate's name, the card should contain the case number and the matrix location. Such cards can be hand printed. Different colored card tabs can be used to signal that a name appears more than once in the file. For example, when a name shows up a second time, the card can be tabbed with a blue tab and filed behind the first card. The third time the name appears, a green tab can be used, etc. See chart 5 below.

CHART 5



VICTIM ASSOCIATE CARD FILE

LATERAL THINKING

LATERAL THINKING

I. Introduction. Summer suits are often made of such a smooth material that the trousers tend to slide off clothes hangers. Edward de Bono, a proponent of lateral thinking, once put the problem to a large number of engineering students at London's Imperial College. Several answers were given, all of which related to hanger design. They completely overlooked the simplest solution, which is to hang the trousers so that instead of both legs going over the hanger bar from the same side, each leg goes over from a different side. Thus, the legs have to slide over each other in order for the trousers to slip off. They do not slip off. (Try it.) However, no amount of attention to the hanger itself would lead to the solution.

We are used to thinking vertically. Vertical thinking is the traditional way of handling information. It includes logic and mathematics. In vertical thinking, we advance progressively through a series of steps, each of which arises directly from the preceding step. We are not allowed to be wrong at any stage. Vertical thinking deals with only what is relevant. Vertical thinking is an incomplete method of using information.

"Logical proof, like mathematical proof, can operate on rigid rules with on-off, true-false, yes-no answers for the very reason that truth and reality are unimportant to logical and mathematical proof."[13]

"In mathematics you can say a X b = bxa with no concern at all for what a and b stand for. Tell this to a computer and tell it further that a = cats, b = rats and x = eat, and it will tell you that cats eat rats is the same as rats eat cats."[14]

In lateral thinking, information is used in a fundamentally different way from vertical thinking. Information is used provocatively to dislocate the pattern and allow it to reform as a different pattern. In lateral thinking, information is used in an unreasonable manner to bring about the emergence of new patterns. In lateral thinking, we realize the arbitrariness of any information arrangement and deliberately seek to generate alternate configurations. We think sideways rather than straight ahead. Lateral thinking involves imagination.

"The principles of lateral thinking can be considered under four very general and certainly not exclusive headings. There is a good deal of fluidity, and some features could be considered under more than one heading or even given a separate heading. The headings are as follows: (1) Recognition of dominant or polarizing ideas. (2) The search for different ways of looking at things. (3) A relaxation of the rigid control of vertical thinking. (4) The use of chance."[15]

We might say that vertical thinking is like building a tower. Each new layer goes on what is already there. Lateral thinking is concerned with building a tower in a different place - with restructuring concepts, not with developing them.

II. Lateral thinking in criminal investigations. As we all know, in real life, some people do things which seem illogical to the normal person. If we attempt to solve illogical crimes by the application of logic alone, we will fail.

The main point in discussing lateral thinking here is to stress the necessity of thinking in different ways. The brain, like the rest of the body, needs exercise to function at full capacity. If only occasionally we engage in calisthenics such as push-ups and pull-ups, we find good performance difficult because we are using muscles we don't ordinarily use. The same holds true of the brain. If we continually think in strictly logical terms, it is difficult to use lateral thinking to find the solution to a crime. Lateral thinking may be the only way to solve a particular crime. One of the best ways to exercise the brain in the area of lateral thinking is to work on puzzles. People who have developed the ability to solve puzzles are able to look at a problem in different ways and find the solution which the strictly logical thinker might never find.

III. Some puzzles to test your lateral thinking ability.

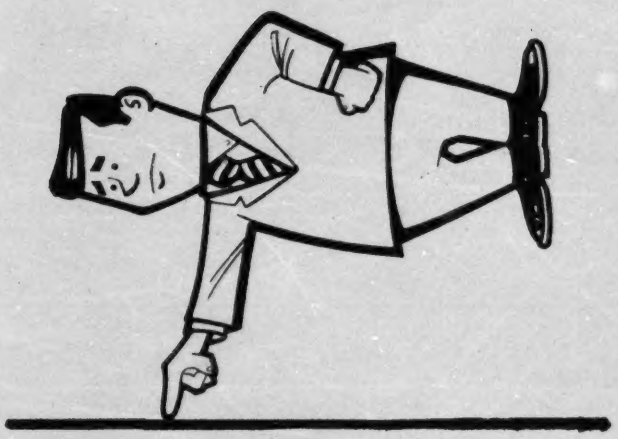
A. You are locked in a room with two doors and no windows. One door leads to certain death, the other to safety. If you stay in the room certain death will result. There is a guard at each door. One of the guards always tells the truth, while the other always lies, but you don't know which one is which. You may exit from either door you choose. It would appear that you have only a 50 - 50 chance of choosing the door to safety. To give you a 100% chance of selecting the correct door, you may ask either guard just one question. What question would you ask to ensure that you choose the door to safety?

B. A man and his son are deer hunting. The man accidentally shoots and wounds his son. He carries the boy to the hospital where a doctor is summoned to the operating room. The doctor looks at the boy and says, "I can't operate on that boy because he is my son." How can this be so?

C. A man, dressed in black clothing is walking on a rural road with his back to traffic. There is no moon light, no street lights, and the man does not have a flashlight. A car being operated without headlights approaches the man from the rear and suddenly stops without striking the man. How could this happen?

D. Two trains were 120 miles apart on a straight stretch of track. They started toward each other at the same time, on the same track, each traveling at a constant speed of 30 miles per hour. At the instant they started, a fly flew from the front of one train toward the other at a rate of 40 miles per hour. As soon as the fly reached the second train, it turned around and flew toward the other, flying back and forth at the constant rate of speed until it was smashed between the two trains when they collided. How far did the fly fly?

E. A man walked into a hardware store and purchased 1 for 50¢, 12 for $1.00 and 144 for $1.50. What commodity was he buying?



LATERAL THINKING IS THINKING SIDEWAYS.

IV. Lateral vs. vertical thinking applied to criminal investigation

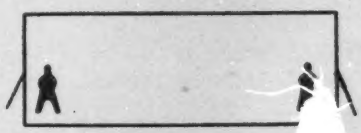
VERTICAL THINKING	LATERAL THINKING
1. There was nobody in the building and everything was secure so it must have been another false burglar alarm.	1. Someone could have hidden away in the building at closing time and set off the alarm as he went out the door.
2. Based on descriptions by witnesses, the robbery suspect is a husky woman.	2. The suspect could be a man dressed as a woman.
3. The two identical sets of footprints in the snow on the steps indicate that a person entered the house and then left by the same door.	3. It could also mean that someone who is now in the house, left the house and re-entered by the same door.
4. The extortion note to the company president proves the company vice-president was kidnapped for money.	4. It could mean that the victim voluntarily disappeared and is attempting to extort money from the company himself.
5. The evidence indicates that the deceased climbed up on a chair; kicked it away and committed suicide by hanging.	5. The victim could have been a masochist who climbed up on the chair, raised his feet to momentarily experience the feeling of hanging, <u>accidentally</u> kicked the chair away and was hanged.
6. The vehicle involved in the hit and run accident was a stolen car.	6. The owner of the car could have reported the car stolen after the accident to avoid responsibility.
7. The car was stolen and then burned to destroy any fingerprints.	7. The owner of the car could have been behind in his payments, burned the car himself to defraud the insurance company and then reported it stolen.

VERTICAL THINKING	LATERAL THINKING
8. Since the burglar knew the combination to the safe it must be an "inside job."	8. Since some people have difficulty remembering numbers, the owner may have used his social security number, date of birth, telephone number, etc. as the combination for his safe. A professional burglar would determine such numbers, common to the individual, in advance and simply try them all.
9. The evidence indicates the security guard shot the youth in self-defense when he came at him with a knife.	9. It could also mean that this was an unjustified killing. The guard could have panicked, shot an unarmed youth, and planted a "drop knife" near his body.
10. Someone apparently picked the trunk lock on the car and stole all the cameras.	10. It could be that the cameras were not in the trunk and the owner is attempting to defraud the insurance company.
11. Apparently the driver fell asleep, ran into the bridge abutment and was accidently killed.	11. It could have been suicide.
12. The "fire bug" who has been burning empty buildings probably set fire to Mr. Brown's store.	12. Mr. Brown's business may have been failing. He could have burned his own store to defraud the insurance company, thinking we would assume the notorious unknown arsonist committed the crime.
13. At the crime scene, try to determine if anything is missing.	13. Try to determine if anything is present that doesn't belong.
14. From the bedraggled appearance of the woman's clothing, it appears that her complaint of attempted rape is valid.	14. She could have staged the incident to get sympathy and attention from her family.

VERTICAL THINKING	LATERAL THINKING
15. The burglary must have been committed by a professional with lockpicks since there is no sign of forced entry.	15. Many people leave all their keys on the key ring when they leave their cars at service stations, garages, and parking lots. The person who has temporary custody of the keys can readily have one or all keys on the ring duplicated and use them to gain entry at a later time.

V. Correct answers to puzzles in III.

A. Your question should be: "If I ask the other guard which door leads to safety, what will his answer be?" When the question is answered, go out the opposite door from that indicated in the answer. It doesn't matter which guard you ask the question of. Think about it!



B. The doctor, a woman, is the boy's mother.

C. It was daytime. The driver saw the man in the road.

D. 80 miles. It will take two hours for the trains to collide and the fly is traveling at 40 miles per hour, so he will travel 80 miles in two hours.

E. House numbers.

GROUP PROBLEM SOLVING

GROUP PROBLEM SOLVING TECHNIQUES

I. Introduction. When one individual has devoted a reasonable length of time to attempting to solve a case without success, or when the facts of a complex case are being investigated, it is often helpful to involve others in the problem solving process.

II. Brainstorming.[16] This is a technique where creative thinking takes precedence over the practical. The idea is to get out before the group all ideas possible, with no thought to how practical the ideas might be. The participants are urged to be as "freewheeling" and uninhibited as possible. The technique can be used to move out on a problem when the more conventional techniques have failed to come up with a solution.

A. Some advantages:

1. Many people are enthused by the freedom of expression inherent in brainstorming.

2. Solutions to previously insoluble problems can be discovered.

3. All members of the group are encouraged to participate.

B. Some limitations:

1. Many individuals have difficulty getting away from practicalities.

2. Many of the suggestions made may not be worth anything.

3. In the evaluation session, it is necessary to criticize the ideas of fellow members.

C. Physical requirements:

1. A meeting room with a chalkboard, flip-chart, or other surface on which the ideas produced can be written hurriedly and preserved for the follow-up discussion period.

2. A conference table or semicircle arrangement to expedite discussion following the brainstorming.

D. Procedure

1. The chairman explains the procedure to be used, and a recorder is selected to list the suggestions on the chalkboard or flip chart.

2. As ideas are thrown out they are recorded in public view. Criticism of individual ideas voiced is not permitted during this period. All ideas are accepted.

3. At the end, the ideas listed are discussed to determine if any have practical application to the problem at hand.

E. Example: BRAINSTORMING A BURGLARY CASE

A complainant has reported that he secured his house before leaving on a trip and that when he returned, the house was still secure but a burglar had been in the house and stolen several valuable items. How could the crime have occurred? A group of detectives might brainstorm the problem as follows:

1. Lock picked.
2. False report - no burglary - inside job.
3. Door left unlocked - burglar locked it on way out.
4. Window left unlocked - burglar locked it and went out door.
5. Door key left under doormat or in mailbox.
6. Burglar broke window - then installed new pane of glass.
7. Burglar broke door - then installed new one.
8. Poor quality lock - slipped with a credit card.
9. Poor quality or worn lock - similar key used.
10. Unauthorized duplicate key.
11. "Little people" entered through mouse hole.
12. Came down chimney like Santa - left by door.
13. Child or midget climbed through dogs swinging door.
14. Invisible man hid in house before owner left.
15. Tunneled in through basement.
16. Burglar hid in basement before owner left.
17. Neighbor in similar house has identical lock - same key fits both.
18. Theft took place before owner left - not noticed until return.
19. Exposed hinge pins removed - door lifted out.
20. Sliding glass door lifted out of tracks to disengage lock.

21. Small glass panel near door broken to reach in and unlock door - new pane installed.

22. Wire hook inserted through mail slot to unlock door from inside.

23. Loose door - shake to open.

24. Door jam spread with pry bar wrapped in cloth.

25. Glass pane from louvre door window lifted out to reach in and unlock door - then put back in place.

Note: Unless the discussion gets completely ridiculous, persons who make "far out" suggestions should not be criticized. This might inhibit another person from making a valid suggestion which he might at first consider to be foolish. What at first may seem to be a foolish idea, may actually be the answer to the problem or give someone else an idea that will lead to the solution. Ideas #11 and #12 above are of course ridiculous, but they led to someone suggesting #13. It's certainly possible that a child could climb through the small swinging door used for dogs. He could have burglarized the house or unlocked a door from inside so a larger person could enter. The same applies to ideas #14 and #15 which led to #16 which is a possible solution. When suggestion #5 was made, it would not be appropriate to interrupt the thinking process and tell the group that the house did not have a mailbox. Later on, someone looked at the chart, saw the word "mailbox" and made suggestion #22 relating to mail slot in the door.

Note: It seems appropriate to mention here, that an analysis of 1,643 burglaries in New York City showed that in nearly thirty percent of the cases, burglars either entered through unlocked doors, windows and transoms or the police were unable to determine the method of entry. (Reported in brochure entitled, "Support Your Local Burglar," published by State Farm Fire & Casualty Co.)

III. Discussion group.[17] This technique involves a group of persons meeting together to discuss informally and deliberate on a topic of mutual concern. It may be used to identify, explore, and seek solutions for problems relating to a crime.

A. Some advantages:

1. Group discussion permits full participation.

2. It pools the abilities, knowledge, and experience of all to reach a common goal (solution of the crime). It is especially useful in complex cases, such as sex murders. In addition to detectives working on the case, participants may include the medical examiner, a psychologist, a criminalist etc.

B. Some limitations:

1. Group discussion is time-consuming, particularly if the group includes persons of widely different backgrounds.

2. A bossy leader or a few members may dominate the discussion.

C. Physical requirements: The group is usually seated around a large table. Face-to-face discussion is essential. An informal and relaxed atmosphere will permit free discussion.

D. Procedure:

1. Should be governed by the group itself. Generally, the leader will preside and moderate the discussion.

2. A group may meet as long and as often as is necessary and convenient.

3. A change of leaders may be made to utilize special individual abilities.

IV. Case study.[18] The case study is a detailed account of a criminal case that may be presented to an audience of detectives in written form, orally, on film, or in a combination of these forms. It may be used to present in detail to a group a criminal problem with which the group is concerned or to present and study the solution of a criminal problem similar to the one confronting the group.

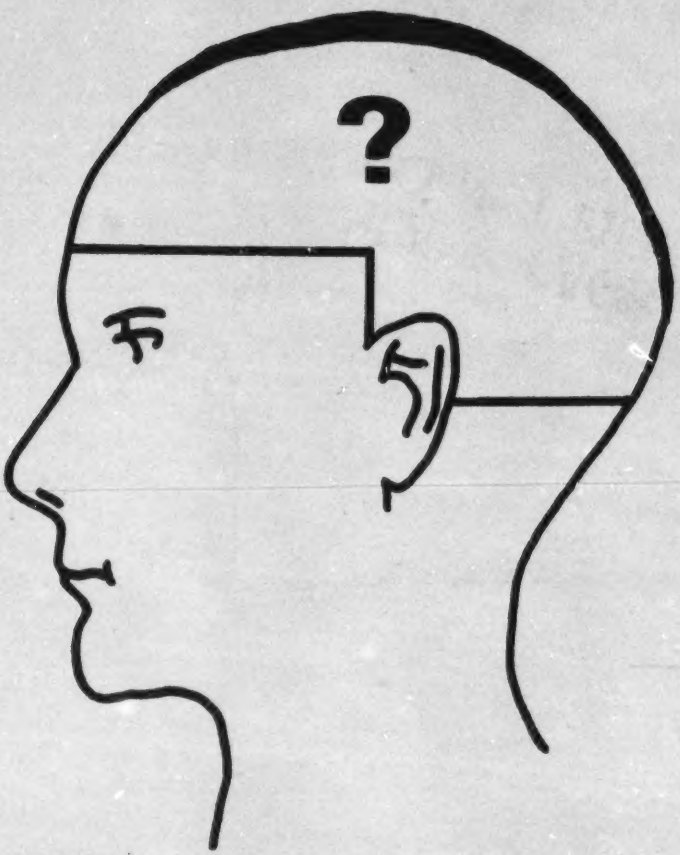
A. Procedure:

1. Materials (copies of case incident reports) are put into the hands of the participants in advance if the case study is in written form and to be read before the meeting.

2. The moderator introduces the topic, explains what the case study is and guides the discussion and other activity.

B. Visual Aids: Tape recordings of witness' statements, color slides, photographs, diagrams, and maps, if appropriate, would be helpful.

PSYCHOLOGICAL PROFILES



PSYCHOLOGICAL PROFILES

I. Introduction. In major cases, investigators sometimes seek the assistance of psychiatrists or psychologists to help determine what type of person may have committed a crime or series of like crimes. Depending upon whether a psychiatrist or a psychologist is consulted, the descriptions are called psychiatric or psychological profiles. Usually, they are all labeled psychological profiles by police.

A. The "Mad Bomber". Over a sixteen year period starting in 1940, the "Mad Bomber" had been detonating homemade bombs in public places in New York City. He had made at least thirty bombs, some of which failed to explode. Occasionally, he had written letters to the police, newspapers, and others. The unexploded bombs and letters were the only evidence the police had. The contents of some of the letters indicated the bomber had a grudge against the Consolidated Edison Company, New York's electric power supplier.

Finally, in desperation in late 1956, three police officers met with Dr. James A. Brussel, a prominent New York psychiatrist. The police were seeking his help in solving the case. They wanted to know what kind of a person they should be looking for. During the four hour meeting, Dr. Brussel studied the bundles of letters and photographs of the unexploded bombs.

By the time this meeting ended, Dr. Brussel had given the officers the following probable description of the bomber:

> Male, suffering from progressive paranoia, age 40-50 years, well proportioned, neither fat nor skinny, introvert, unsocial but not anti-social, lives alone or with an older female relative, completed at least two years of high school, a Slav, Roman Catholic who attends church but not confession regularly, moral, honest, not interested in women, may live in Bridgeport, Connecticut (none of the letters was mailed from there), chronic illness (heart case), present or former Consolidated Edison employee, will be wearing a double-breasted suit with buttons buttoned when arrested.

Shortly before midnight on January 21, 1957, police arrested George Metesky, the "Mad Bomber" at his home. His description was as follows:

> Male, suffering from progressive paranoia, age 54 years, 5 feet 9 inches tall, 170 pounds in weight, well proportioned, neither fat nor skinny, introvert, unsocial but not anti-social, lived with two older sisters, completed two years of high school, of Polish descent, Roman Catholic who attended church but not confession regularly, moral, honest, not interested in women, lived in Waterbury, Connecticut, chronic illness (tuberculosis), former employee of a company which merged with Consolidated Edison.

On September 5, 1931, George Metesky, while on the job, had been knocked down by a backdraft of hot gasses from a boiler. He had complained of headaches and other symptoms for several months. He was discharged from his job after medical examinations failed to reveal any tangible injuries. He alleged the boiler accident had given him tuberculosis, but his claim for permanent disability pay was denied.

George Metesky had been wearing pajamas when the police officers arrived at his house. Allowed to dress, he put on a pin-striped double-breasted suit and buttoned the buttons.[19]

B. The Christmas Eve Killer. A widow in her middle forties was killed on a New York City street one night. She was stabbed numerous times in the chest and abdomen with a small sharp knife. The murderer took her drivers license and lipstick from her purse. Then, with the lipstick he scrawled an obscene phrase on the outside of the purse and on the side of a nearby house.

Dr. Brussel's profile of the killer, which proved to be accurate, described him as a young man suffering from simple schizophrenia, withdrawn, a loner, lacking friends, thin build with acne, not doing well in school if attending, and working in some menial job with a spotty work record if employed. Further, the doctor deduced that the killer probably lived near the murder scene.[20]

C. The theory behind psychological profiles. "Generally, a psychiatrist can study a man and make a few reasonable predictions about what the man may do in the future - how he will react to such-and-such a stimulus, how he will behave in such-and-such a situation."[21]

The profile is arrived at by applying some common psychiatric principles in reverse. By studying a man's deeds, the psychiatrist deduces what kind of a man he might be.[22] The psychiatrist has certain statistical data available to him to help arrive at the profile. For instance, in the Mad Bomber case, Dr. Brussel referred to a study conducted by Ernst Kretschmer. Studying approximately ten thousand patients in mental hospitals, Kretschmer found that about 85 per cent of paranoiacs were symmetrically built. Based on this study, there was a 17 in 20 probability that the Mad Bomber's build was symmetrical.[23] The same study was referred to in the Christmas Eve Killer case. The probability was that the killer, believed to be a simple schizophrenic, was thin for his height. The typical lean, angular schizophrenic is likely to have sluggish circulation which causes pimples, pustules, and an ugly complexion in general. People with more compact physiques are less likely to suffer from this kind of problem.[24]

D. Symbolic or substitute behavior. "According to the psychoanalytic theory, the real motives of a crime may be quite different from those which are indicated at the scene or which the perpetrator may divulge on questioning. Thus, an object stolen may in reality represent love or desire, and the victim of a violent crime may be chosen as a substitute for some hated person who the perpetrator fears to approach."[25]

E. Apparent absence of logic. The problem with trying to solve crimes committed by persons with mental disorders is that their acts often seem illogical. We have to realize that there is often a "method in their madness". Many do not act totally irrationally. There is logic, a rationale, hidden behind what they do and how they do it. The Mad Bomber for example believed that people were plotting against him. Once you grant his mistaken central premise, everything else is perfectly logical.[26]

II. The application of abnormal psychology to criminal investigations.

Chart 6 lists the various types of disorders along with the most common characteristics and some pertinent remarks. The chart is intended to show only how the subject of abnormal psychology (and psychiatry) can assist in criminal investigations. It shows how psychological profiles are arrived at. Bear in mind it is impossible to place human beings in specific categories and be able to say that everyone in a given category has certain mental characteristics and not others. Each person is different. Only generalities are used in the chart and this could lead to incorrect assumptions. Investigators are encouraged to give further study to the subject of abnormal psychology and the relationship between the various types of disorders and crime. The services of professional psychologists and psychiatrists should be obtained to help develop suspect profiles in unsolved major crimes, such as sex related homicides where mental disorders may have led to the commission of such offenses.

Chart 7 shows a profile for the "Boston Strangler", who murdered thirteen women.

CHART 6

TYPE OF DISORDER	CHARACTERISTICS	REMARKS
A. NEUROSIS	Basic feeling of inadequacy. In touch with reality, except in the area of sickness. Normally doesn't need hospitalization. Generally not injurious. Does not hallucinate. Socially acceptable. Inability to resolve anxieties.	
1. Anxiety State	Apprehension, fear, panic without cause.	
2. Hysteria	Blindness, amnesia occuring during stressful situations.	
3. Neurasthenia	Weakness of nerves - chronic weakness & fatigue due to feelings of inadequacy.	
4. Psychasthenia (Obsessive compulsive behavior type)	Uncontrollable inner compulsions to think, feel, or act in a certain manner.	Kleptomania (stealing), pyromania (fire bug), exhibitionism, Peeping Tom, obscene phone calls (usually made from same telephone).

CHART 6

TYPE OF DISORDER	CHARACTERISTICS	REMARKS
B. PSYCHOSIS	Hallucinations, delusions, inability to distinguish fantasy from reality. Disoriented.	Injurious to self and others.
1. Organic		Caused by organic malfunction.
a. Toxic		Alcohol, some drugs, mind affecting poison such as lead-based paint.
b. Degenerative		At approximately age 35, the mind slowly begins to degenerate.
c. Trauma		Physical & mental injury. Organic brain damage. Example: "Punch drunk" boxer.
2. Functional		Personality not functioning in proper manner.
a. Schizophrenia		
(1) Simple	Uninvolved, disinterested, asocial, "wallflower", unhappy. 98% not dangerous.	Loner, tramp, hobo. Only about 2% are dangerous. In homicides, may cut up body - probe body. Usually takes souvenier from victim. Commits sex murders. Doesn't think it's a crime. May leave fingerprints & other evidence. Will probably beat the polygraph. If young, probably lives within a few blocks of crime scene. Typically lean build. May have poor complexion due to sluggish circulation.

CHART 6

TYPE OF DISORDER	CHARACTERISTICS	REMARKS
Schizophrenia (cont'd)		
(2) Hebephrenia	Silliness, laughing, child-like mannerisms, outward bizarre behavior.	About 3 to 5% dangerous - usually to themselves. May [illegible] off own testicles. If they i[illegible]re others, it is usually members of own family - ax murders of entire family, etc.
(3) Catatonic	Propensity to assume fixed positions - statue-like, stupor, immobility, tension.	Has extreme strength when coming out of trance. Mace not effective.
(4) Paranoid	Totally illogical. Disoriented delusion, suspicion, feelings of persecution, totally dis-organized. Has hallucinations.	Usually full bloom around age 30. (Boston Strangler)
b. Paranoia	Single well systematized delusion - grandeur - perse-cution. Logical. Takes a kernel of truth and warps it. Attracts inadequate per-sonalities. (Charles Manson)	Takes on a mission. Prone to kill political figures at close range. Probably is symmetrically built - neither fat nor thin. (New York's Mad Bomber).
c. Manic-Depressive		
(1) Manic type	Excited, full of energy, full of advice, agressive.	
(2) Depressive type	Lack of energy, deep sadness, regret.	
(3) Circular type	Alternating manic & depressive behavior.	

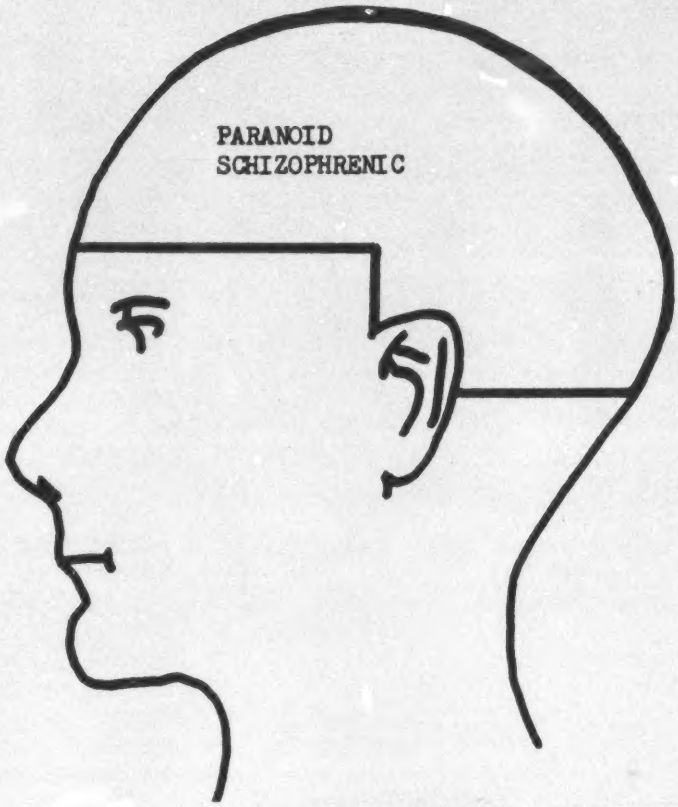
TYPE OF DISORDER	CHARACTERISTICS	REMARKS
d. Involutional Melancholia	Depression, despondency, delusions, self-criticism, agitation, suicidal tendencies.	Associated with change of life. (biological) Approximately 40% of suicides by people over age 30 fall in this category. Wife may kill husband over small matter. In suicide or homicide/suicide combination, usually something important has occurred within 6 months. (retirement, children grown up and left home, etc.)
C. PERSONALITY DISORDERS	Life long patterns of inflexible or limited behavior caused by defective development of the personality structure. They have developed a life style. In touch with reality.	
1. Psychopath or Sociopath (Antisocial personality)	Inability to establish warm personal relations.	Impossible to cure. In 1963, 35% of inmates at Sing Sing Prison were psychopaths.
	Disregard for community or group standards or behavior.	Strong tendency to return to crime scene and offer help, ask questions. May write to police.
	Apparent absence of guilt feeling.	Nearly all hired killers are psychopaths.
	Failure to learn from punishment. Desire for immediate satisfaction. Continued sexual experimentation. Undue dependence on others. Usually an extrovert. Morally insane, lacks a conscience, con-artist, convincing liar, intelligent, wants personal freedom.	

CHART 6

TYPE OF DISORDER	CHARACTERISTICS	REMARKS
2. Dysocial or Amoral Personality	Complete disregard for any form of established social or cultural code. Usually at war with established forms of authority.	Often turn to gangsterism, racketeering, prostitution and other crimes motivated by gain rather than any deep feelings of hostility or anxiety. Don't want to be rehabilitated. (In 1963, 31% of inmates at Sing Sing Prison were in this category.)
3. Inadequate Personality (Immature)	Approaches personal problems with child-like attitude. Solutions consider neither the right nor wrong of a situation, but rather immediate comfort or gratification.	

References for this chart: Handouts and classroom instruction by Special Agents Mullany and Teten, FBI National Academy, Quantico, Virginia, December 1972.

THE BOSTON STRANGLER CHART 7



PSYCHIATRIC PROFILE [28]

Loner - unmarried - troubled with sexual inadequacy - average or better intelligence - certainly not mentally retarded - average height and weight - well proportioned - muscular - age in late twenties or thirties - average appearing man - nothing unusual that would attract attention - very cautious - neat - clean - tidy - cleanshaven - fingernails clean - has mane of hair lovingly tended - obsessed by his relationship with the opposite sex - Italian or Spanish extraction - dresses neatly and quietly in clothes that don't attract attention.

Note: This profile was compiled by Dr. James A. Brussel, a member of the special Medical-Psychiatric Committee looking into the sex murders of 13 women in the Boston area during the period June 14, 1962 to January 4, 1964. The profile proved to be accurate except that Albert DeSalvo, later identified as the Boston Strangler, was married. His sexual relations with his wife were unsatisfactory and he wanted to kill her, but didn't.

CRIMINAL INVESTIGATION - ABNORMAL PSYCHOLOGY QUIZ

Match the six possible descriptions of suspects in the right column with the ten crimes they may have committed in the left column. Print the letter representing the correct description on the line provided. Some of the descriptions will fit more than one crime. Check your answers with the information contained in chart 6.

NATURE OF CRIME

___ 1. A man makes obscene phone calls to women every day at 0800 hours.

___ 2. A married man is found shot to death in his bed. His own hunting rifle was the weapon used.

___ 3. A well-dressed woman continually shoplifts inexpensive items from a drug store.

___ 4. A sex murder in which the body has been dismembered. The victim's panty hose is missing from the body.

___ 5. A series of arson fires in large empty warehouses which are owned by different people.

___ 6. A political figure has been shot and killed at close range.

___ 7. An entire family has been murdered in their home with an ax.

___ 8. A woman casually walking in the park has been raped and murdered.

___ 9. A "Peeping Tom" looks in a woman's bedroom window every night.

___ 10. A man exposes himself to school girls.

MENTAL DESCRIPTION OF SUSPECT

A. Suffers from depression, despondency, delusions, self-criticism, agitation. May react violently over a small disagreement.

B. Uninvolved, disinterested, selfish, solitary, withdrawn, wallflower, unhappy. Would probably "beat" polygraph.

C. Silliness, laughing, child-like mannerisms, outward bizarre behavior.

D. Uncontrollable inner compulsions to think, feel, or act in a certain manner. In touch with reality except in area of sickness. Inability to resolve anxieties. Basic feeling of inadequacy.

E. Single well-systematized delusion - grandeur - persecution. Logical. Takes a kernel of truth and warps it. Takes on a mission. Attracts people with inadequate personalities.

F. Inability to establish warm personal relations. Apparent absence of guilt feelings. Does not learn from punishment. Desire for immediate satisfaction. Lacks a conscience. Intelligent. Wants personal freedom. Morally insane. Has developed a life style. In touch with reality.

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